PUBLIC INTEREST STANDARDS FOR CANADIAN RAIL RATE REGULATION: DIFFERENTIAL PRICES, ACCESS AND PRICE CEILINGS

Statement of William J. Baumol

My name is William J. Baumol. I reside at 45 Ocean Avenue, Monmouth Beach, New Jersey, 07750, USA. I am professor of economics and Director of the C.V. Starr Center for Applied Economics at New York University. I have been invited by Canadian National Railroad to prepare a statement for Transport Canada in response to its announcement "Review of the Canada Transportation Act (CTA) Terms of Reference." This statement is intended to express my views on the essential elements of a program of rail regulation that effectively serves the public interest. It is based on nearly forty years of experience in working on rail regulation in the United States, both in university studies and in the actual regulatory arena. The views expressed here are entirely my own and may or may not coincide in detail with any opinions held at Canadian National.

To add a little further information about myself and my qualifications, I note that I received my bachelor's degree in economics from the College of the City of New York in 1942 and my Ph.D. from the University of London in 1949. After my military service in Europe during World War II, I taught at the London School of Economics from 1947 through 1949. I then served as a member of the faculty of Princeton University for 42 years, where I recently became professor emeritus, and where I still hold an appointment as Senior Research Economist. I have written approximately 30 professional books and 500 articles. I have served as president of four leading professional organizations of economists including the American Economic Association, the world's largest organization of economists from business, government, colleges

and universities. I hold nine honorary degrees and other honors in the United States and abroad, and am a member of three of the nation's leading honorific societies, including the National Academy of Science.

I have taught university courses on the economics of antitrust, regulation and industrial organization, and have been invited to lecture on these subjects in forums throughout the world, most recently in Australia, France, Israel, Italy, England and Venezuela. I have also written a number of articles and books related to these subjects and have testified extensively on antitrust and regulatory issues before courts and regulatory agencies in the United States and abroad. Over my almost fifty years of activity as an economist, I have analyzed a number of issues related to antitrust matters in a wide variety of industries. Attachment A to this statement provides a fuller description of my qualifications. Over the years I have prepared a number of statements containing further discussions of the matters considered here, and these are available on request.

I. Statement of the Issue and Review of the Basic Elements of Rational Rail Regulation.

It is now widely recognized that continuing regulation of the railroads serving any industrial economy is required to protect the interests of consumers and the immediate users of their services, the legitimate needs of competitors and the efficiency of the economy generally. However, it has also become clear that regulation that is badly designed can impede the efficiency of the railroads in serving the public and even undermine their ability to operate in a marginally acceptable manner. This observation underscores the need for careful consideration and analysis of the regulatory rules, an analysis that must be rigorously defensible and simultaneously disinterested. I trust the materials that follow can be taken to approach that goal.

The discussion here will, of course, not deal with rail regulation of all sorts, and will omit such important arenas as environmental and employee safety regulation. Rather, it will focus on the sort of regulation that is called for in areas in which market forces are deemed not to be sufficiently powerful to elicit reliably from the participants in the markets the sorts of activities and decisions that best serve the public interest. It is generally agreed that where a market is effectively and sufficiently competitive no regulatory intervention is required or even appropriate, because competitive pressures will constrain all decision makers to behave in a manner consistent with efficiency in serving the public. The implication is that the mechanism of competitive markets and the nature of the constraints they impose on business decisions are the appropriate guide for regulation that is intended to serve as a substitute for such effective competition in arenas from which it is absent or in which it is insufficient. Later in this statement, the nature of the guidance this competitive market model provides to the regulator will be discussed in greater detail.

More specifically, the statement will focus on three major regulatory issues that seem now to be at the forefront of discussions, throughout the industrial world, of the proper role and functioning of regulation. These issues are

- **Adequate Earnings: Meaning and Significance** – why adequacy of earnings matters for the economy as well as for the individual railroad, and how it is determined;
- **The role of differential pricing** – whether it constitutes monopolistic exploitation of users of transportation services or, at the other extreme, it is a natural feature of the workings of the railroad industry, is on balance beneficial to the public, and essential for survival of an efficient rail network;

- **Conditions of access** – where a railroad possesses "bottleneck facilities," facilities of which it is the sole proprietor, and without which competitors cannot operate viably in the affected portions of the rail network, the issue is whether the proprietor of the bottleneck facilities should be required to provide access to these facilities to others, including actual and prospective competitors, or should provision of access be left to voluntary negotiation by the immediately affected parties. And what terms of compensation and other conditions should apply either to imposed access or to the outcome of voluntary negotiation?

- **Ceilings on rates –** what limitations on rates charged to shippers are appropriate in markets where there is reason to believe that a railroad possesses market power?

The remainder of this statement will discuss each of these issues, showing that the competitive market model provides the necessary guidance and offers very explicit rules for use by the regulator who is seeking to elicit competitive behavior from the regulated enterprise and to do so in a manner that preserves the incentives for that firm to serve the interests of the economy in the most efficient and effective manner.

Specifically, I will show that differential pricing is often indispensable for financial viability of the regulated firms,[1] and their ability to maintain, expand and modernize their facilities, demonstrating also that differential pricing is compatible with the public interest and with effective competition in industries that share pertinent economic features with those of the railroads.

[1] This role of differential pricing has been recognized in the economic literature at least since the work of F.Y. Edgeworth toward the end of the nineteenth century.

On the issue of access I will show that the key issue is competitive neutrality – that whenever access to bottleneck facilities is made available to others beside their proprietor, the terms and conditions should not impose a relative competitive handicap on either the proprietor or the firm to which access is provided. In that way the market will be able to allocate the use of the facilities to the firm that can employ them most efficiently in meeting demand for its final product. Moreover, it will be demonstrated here that there is one and only one access price that will satisfy this competitive neutrality requirement. This is the pricing rule that has come to be referred to as "parity pricing" or "ECPR" (the efficient component pricing rule).

Finally, I will show that the competitive market model also provides an explicit rule for ceilings on prices suspected of exceeding competitive levels. This ceiling is what is referred to as the "stand-alone cost" of the product or service in question. It is the price that could not be exceeded in a market into which there was no impediment to entry, because any higher charge would attract entrants who would soon force those excessive prices to decrease. It is consequently the price ceiling that is appropriately imposed by a regulator who is seeking to compensate for the absence of effective competition in markets where entry is in fact not easy, so that regulatory intervention is appropriate.

II. On the Competitive Market Model: Guide for Public Interest Rail Regulation

A principle almost universally applauded, but all too often honored only in the breach, is that regulatory rules should serve as a substitute for competition in arenas where competition is difficult to sustain. This means that it is the duty of regulators to require the firms they oversee

to behave as they would if their activities were carried out in a competitive market place. But this guiding principle also means that regulatory intervention must go no further. It must not force firms to adopt measures that they would not have to accept in a fully competitive market. Experience repeatedly confirms that well intentioned but misguided attempts to constrain pricing, investment and other related activities of firms more severely than they would be by competitive forces introduce inefficiencies that raise costs, degrade service and infrastructure and seriously damage the public welfare.

The rationale for these conclusions is provided by systematic economic analysis as well as by extensive experience. Economics has repeatedly demonstrated that competitive markets lead to economic efficiency, precluding waste, excessive costs and outputs that are not guided by consumer demands. Competitive markets yield prices that reflect the low costs made possible by efficiency and which provide no excessive profits. Moreover, the prices that emerge in such markets can be shown to provide the right incentives for production to be carried out by the most efficient suppliers in the most efficient way currently possible. In short, the competitive market model is an appropriate guide for regulation because there is no known economic arrangement that serves the public's economic interests more efficiently and effectively.

The form of competition that regulators can use as a model for the policies they adopt is also of considerable importance. The textbooks of economics emphasize the concept of *perfect competition* and, subject to some reservations, point out that it is a model of ideal performance. But the usefulness of this concept for the realities that face the regulator is very limited. Perfect competition can only occur where all scale economies are absent, where the market is served by a vast multitude of minuscule firms and when a firm can recoup its total expenditures, including fixed and sunk costs, via prices no higher than marginal (variable) costs. Regulators, in contrast,

deal for obvious reasons primarily with large enterprises, many, as in the case of the railroads, with huge sunk and fixed costs, and often with economies of scale (density). For such a situation the appropriate model for regulation is not perfect competition, but the less theoretical concept of contestability.

A contestable market is one in which the incumbent firms are disciplined by the constant threat of entry, made possible by the absence of all impediments to the establishment of new firms. That threat prevents incumbent firms from adopting excessive prices, earning excessive profits or operating inefficiently. Thus, the behavior of firms operating in a contestable market is an appropriate objective for regulation to pursue for regulated firms in markets that are not contestable. Specifically, while railroads do face effective competition, one cannot claim that the markets in which they operate are perfectly contestable. Indeed, that is, in substance why they are regulated. But a defensible goal of regulation, then, is that railroads act *as they would if their markets were perfectly contestable*, that is, if they were vulnerable to rapid entry without cost barriers to the entrant.

All this, in turn, has several clear implications:

1. Regulators should never intervene where competition is already reasonably effective.

2. Effectiveness of competition should be judged by the power of the market constraints that face the firms in a market. Thus, if railroad pricing and service is effectively constrained by market forces, those markets are effectively competitive. It does not matter whether those constraints are provided by railroads with parallel routes or by geographic or

intermodal rivalry, as long as the resulting constraints on behavior are sufficiently powerful to prevent monopoly prices and profits and to preclude inefficiency.

3. Since regulation should never force firms to do what they would not accept in a competitive market, rules that threaten to drive their earnings below a competitive level should never be adopted. The obvious consequence of violation of the preceding principle is inadequacy of investment and deterioration of service and infrastructure. No law can force investors to provide resources to an industry that only offers losses to those investors, or whose returns are lower than the investors can obtain in other markets.

4. Even in a contestable market entry will never occur unless the entrant can expect to cover *all* its costs, including fixed and sunk costs. Often this will not be possible without differential pricing. Thus, while such pricing is not possible in the theoretical model of perfect competition, in a contestable market it is possible, and may even be unavoidable, so long as it does not yield excessive profits. It cannot yield such profits in a contestable market because profits of that magnitude would rapidly attract entry, and the competition of the entrants would promptly terminate them.

5. In competitive markets of reality firms often offer access to their facilities to others, including competitors. But they do so only after voluntary negotiation elicits a price that makes it profitable for the owner of the facilities to permit such access. The principle that regulated firms should never be forced to do anything they would not do in a competitive market therefore indicates that access must be priced at a level that would induce firm to grant it voluntarily. Enforced access, in violation of the competitive market model for regulation, is likely to be a source of inefficiency, inadequate earnings and degradation of

service. If the price of access is set below the competitive level, that is, below the level that would induce access to be provided voluntarily in a competitive market, the result must in effect be subsidized entry. Such entry terms permit inefficient entrants to out-compete and destroy incumbents, not by virtue of the entrant's superior performance, but through the special financial advantages conferred upon it. While such subsidized entry has the spurious appearance of enhancing competition, it really threatens to undermine both performance and true competition.

6. The contestable market analysis also provides guidelines for rules that prevent excessive prices. Any price must be deemed excessive on that standard if it exceeds the minimum level at which profitable entry can occur. This level of price is said by economists to be a price equal to *stand-alone cost*. Hence, the proper competitive market ceiling for regulated rates is stand-alone cost, a standard that will be discussed further later in this statement.

This completes my brief and superficial review of the logic of the competitive market model for regulation and its implications for the subjects at issue here.

III. Adequacy of Revenues, Criteria and Implications for the Public Interest

If railroads are not permitted to charge rates sufficient to pay for the fixed and sunk investments in their service, then they cannot earn revenues adequate to attract capital. The uncircumscribed capital market cannot force investors to channel their funds into enterprises that only incur losses, or even into firms that do not offer a return as high as is currently provided by competitive industries elsewhere. Without capital, railroad efficiencies will evaporate and

variable costs will increase. Those shippers who cannot afford the corresponding rates will depart from the railroad, leaving the fixed and sunk costs to be borne by the remaining shippers many of whom, presumably, are paying as much as they can already. As revenues decline, so will service, thus driving still more shippers away. Less and lower quality rail service will result; in extreme cases, lines that could have been sustained will be abandoned, and shippers near those lines will lose service altogether. In short, inadequacy of revenues is unavoidably a critical threat to the condition of the rail network, to the contribution it can make to the economy and, ultimately, to the viability of that network.

But what standards do we have for determination of adequacy of revenues? Evidently, to be adequate, the revenues must cover all variable costs of the railroad, including in this the current competitive rate of return on rail investment. But it must provide more than that. If the rail network is to continue in existence and to continue to provide service it must generate financial returns sufficient for renewal and upgrading of plant and equipment as that is required and appropriately carried out. But the problem here is that the amount of investment that is to be recovered is not immediately self evident. An investment that cost a million dollars 40 years ago is no longer to be evaluated at that same amount. At the very least inflation must be recognized to have changed dramatically the purchasing power of one million dollars. But adjustment for inflation is not the answer. The proper answer, here as elsewhere in our story, is found from the competitive market model.

And from that model we obtain straightforward guidance. In a competitive market an asset is not valued at its historical cost, even after adjustment for inflation, because historic cost generally bears little if any relation to current market conditions, that alone are relevant. The asset is also not valued in a competitive market at its reproduction cost, that is, at the cost of

precise replication of the facility, because currently there are likely to be better ways to replace the asset's capacity.

Instead of either of these, in a competitive market any asset that is not scheduled for abandonment rather than eventual replacement, is valued at its *current replacement cost*, that is, the lowest cost, using the most efficient technology currently available to replicate the *productive capacity* of the asset in question. If that million dollar asset currently would cost $19 million to replace with an asset of equal capacity, and such assets are currently being bought at that price, then in a competitive market no one will accept a purchase bid of $1 million or $5 million or even $15 million for the asset, because the current market value of the remaining capacity is $19 million. Similarly, if vastly improved technology has made it possible to replace the capacity of the asset for $500,000, then no rational buyer will pay a million for it. That half million is what the asset is really worth to any buyer or any seller and that is what it is worth to the economy generally.

In sum, as the competitive market model demonstrates unequivocally, the proper value of any asset that is scheduled for eventual replacement rather than abandonment is its replacement cost. Regulation that uses any other standard for asset valuation is sure to be overcompensating investors or, in effect, cheating them. But more important, it will not be providing the railroad with the right quantity of resources to replace the asset when the time to do so arrives.

Replacement cost, then, is the amount of asset value that railroads must be given the opportunity to recover in order to be able to meet the capital requirements of the system. But meeting of the capital requirements of the system also requires that the railroads be able to attract equity and debt capital. This it must do in the most competitive of markets, the capital markets, in which the railroads literally compete with every other industry in the economy that seeks

funds from investors. Railroads can achieve adequacy of revenues only if they are able to compete successfully in the capital markets.

To compete successfully in the capital markets, railroads must be able to offer a return equal to that provided on investments in other industries of similar risk. Those competing investment opportunities constitute the opportunity cost of funds invested in railroads, and they establish the cost of capital for railroads. This analysis is as true of the earnings of the railroads themselves as it is of funds obtained elsewhere. Owners will not allow earnings to be reinvested in the enterprise if there are other investments that provide an opportunity for a higher return at no greater risk.

Adequate returns are not matters of balancing of interests, or value judgments, but are a requirement of productive efficiency – providing an opportunity to attract the capital necessary to replace, modernize, and expand the system. Investors will invest only if they have confidence that, over the life of the investment, they will get back an amount equal to the purchasing power of the funds they invested, plus their opportunity cost from foregone investments.

It follows that the cost of capital that defines an adequate return is the current, forward-looking cost of capital. For both debt and equity, the competition for funds is the avenue to new investments. And for debt (as for equity), the relevant cost, as the competitive market model for regulation demonstrates, is the current cost of debt, not embedded debt. This is the figure for debt that must be used in determining the cost of capital as part of the measure of adequate returns. Moreover, adequacy of revenues requires the opportunity to earn the cost of capital on all assets that must be replaced, and not just on new assets, because otherwise investors will learn soon enough that they are apt to be deprived of the opportunity to earn appropriate compensation

on older investments and that will lead them to avoid further sinking of investment in the new assets required for viability and efficiency.

IV. Differential Pricing and Adequacy of Revenues

As I will demonstrate next, solvency often is impossible without recourse to differential or "discriminatory" prices. Moreover, I will show that effective competition in the form of a contestable market, with its totally unimpeded entry, does not prevent the adoption of such prices if they are required to prevent insolvency. Moreover, it will be shown in a later section that in markets into which entry is quick and easy differential (i.e., discriminatory) prices will often be *the only way* to enable revenues to cover costs.

An example will be sufficient to prove the basic contention. Specifically, I will show that there may easily be circumstances in which customers as a group desire a product and are willing, taken together, to pay an amount sufficient to make its production possible. Nevertheless, in the case that will be examined, failure to adopt discriminatory prices makes survival of the supplier impossible, while discriminatory prices will permit profitable production.

Consider an airline whose productive capacity – airplanes, crews and so forth – enables it to provide 65,000 passenger trips a month. The airline requires revenues of $15 million a month in order to maintain that productive capacity, given its costs of airplanes, crews, and other costs. Assume for simplicity that the airline has two types of passengers: business travelers, whose demand is inelastic, and personal travelers, whose demand is elastic. Assume further that, if the airline were prohibited by regulation from differentiating its pricing to these two classes, and instead were required to charge the same number of dollars per passenger mile for every trip, its revenue-maximizing price would be equivalent to $500 per passenger trip. At that price,

however, the airline would attract only 30,000 passenger trips, and the resulting revenues of $15 million would be far short of its revenue requirement. If, however, the airline charged business travelers an average of $1000 per trip, it would attract 15,000 business trips, yielding revenues of $15 million. And, it would then be able to charge personal travelers $300 per trip on average, because that price would attract 50,000 personal trips, yielding the remaining $15 million in required revenues.

This result clearly is not true only for the numbers used in the example. It will always be true when fixed and sunk costs are high, the market has different groups of customers with different demand attributes, and there is no uniform price that will yield revenues sufficient to recoup the substantial common costs. That is one reason why so many activities that are hardly monopolies, from medicine to passenger air transportation, are forced to resort to differential pricing. It can be demonstrated using the tools of economic analysis that the need for differential pricing in order to attain solvency is not a fortuitous phenomenon. Rather, it is normally to be expected in any industry with substantial sunk and fixed cost and in which competition prevents the firms from earning monopoly profits.

I conclude from this analysis what economists have long known, that since viability of firms is necessary for them to provide their services to the public, differential pricing is not merely an instrument for exploitation of consumers and in an effectively competitive market such prices will serve the public interest.

V. On Access Pricing: the Competitive Neutrality Objective and the Pricing Solution

Railroads in several countries have recently been subjected to a regime of imposed access, and in many other places they have been faced with a variety of proposals with that objective. These proposals range from the requirement that railroads open their lines for use by all competitors at regulated rates to a proposal that the railroads be required to switch traffic to competitor railroads, but only at designated points.

In any substantive access proposal, some procedure for the pricing of access must be included, because otherwise the arrangement becomes a sham. If the price demands by the proprietor of the facilities to which access is sought are not constrained either by market forces or by regulation, that railroad can clearly nullify any imposed access proposal by demanding a vastly excessive price. On the other hand, if the rules require access to be granted at an excessively low price (as regulation has often done in the past), then the proprietor of the facilities will be forced to subsidize the use of those facilities. More than that, if the imposed price is not compensatory, then responsibility to investors will require the owner of the facilities to withdraw resources from them, leading to deterioration of facilities and the quality and quantity of service they can provide. The alternative, as experienced in a number of other countries, is to prevent such deterioration by heavy (and, often, rapidly growing) government subsidies.

The issue then, is to avoid an access price that is too high or too low. An excessively high price will patently give the owner of the bottleneck a competitive advantage in the final product market over the competitor who rents access to the facility. Similarly, a price that is excessively low will provide such a competitive advantage to the firm that is given access, relative to the position of the facility's proprietor. The problem, then, is to determine the

magnitude of the in between price that is *competitively neutral*, giving no artificial advantage to either of the parties directly affected.

A. The Competitive Neutrality Formula for Parity Pricing of Bottleneck Service

The central result that underlies the access pricing rule for competitive neutrality is the **Level-Playing-Field Theorem** (for which a very simple proof is provided in Exhibit 1 below). It tells us that only by using the following formula can we neutrally price a monopoly-owned bottleneck service that is used by both the owner of the bottleneck and its rivals in the final product market who cannot operate without that service. Prices that satisfy this requirement are referred to in the economic literature on regulation as **parity prices** or **ECPR prices** (where ECPR is the acronym for efficient component pricing rule).

Specifically, this rule states that a necessary condition for a level playing field and, hence, for efficiency in the competition between the bottleneck owner and its competitors requires the bottleneck service to be priced as called for by the following competitive neutrality formula:[2] Bottleneck service price per unit – Bottleneck owner's final product price – the Incremental cost to the owner of all final-product inputs, other than bottleneck service.

For it can easily be demonstrated (see Exhibit I below) that, at any other price for the bottleneck service, a competitor's minimum viable final product price will not equal the bottleneck owner's, plus (or minus) the competitor's cost advantage (disadvantage) in supplying the inputs other than the bottleneck service needed for the final product. In other words, at any

[2]As others with whom I have previously written on the subject and I have repeatedly emphasized, this pricing rule is necessary but not sufficient by itself for economic efficiency or protection of the public interest. These goals require, in addition, either effective competition or regulation in the final-product markets to ensure that the final-product prices yield no monopoly profits and no other efficiency-undermining distortions.

other bottleneck-service price one of the suppliers of final product will be unable to achieve the final product price advantage to which its own efficiency entitles it.

The analysis underlying the parity principle solves the problem of determining a competitively-neutral price for bottleneck input. Here we say that the price is competitively neutral if the price that the bottleneck owner charges to others for use of the bottleneck facility is the same as the price it effectively charges itself for the same service. But what price can the owner firm be said to be "charging itself?" The formula of the parity principle rule implies that the price that the bottleneck-owner firm charges itself for bottleneck input is simply the price the firm charges to the final-product customer, minus the incremental cost to that firm of the remaining inputs of the final product, including the requisite capital. The parity principle tells us that this price that the bottleneck owner implicitly charges itself for bottleneck input is the price at which competing final-product providers should be entitled to purchase bottleneck input.

The logic of the proof that the parity-pricing formulas satisfy this requirement is not difficult to understand. It employs a simple criterion of competitive neutrality. Suppose, for example, that the competitor who purchases access to the bottleneck facility is the more efficient producer of the final product, and can provide everything other than the bottleneck service at a cost X dollars per unit lower than the bottleneck proprietor can. Then the access price is defined to be competitively neutral if after paying that price that competitor can afford to provide final product exactly X dollars more cheaply than the bottleneck owner's final-product price. In other words, the access price is competitively neutral if it neither adds to nor reduces the competitor's pricing advantage deriving from its X dollar cost efficiency advantage.[3]

[3]The costs of "bottleneck service " that are excluded from the bottleneck owner's incremental costs for purposes of the formula in the text do not include the owner's incremental costs of running its own trains over the bottleneck

It should also be noted that the parity-pricing rule is not very difficult to carry out in practice or for the regulator to monitor. Nowadays, in regulatory arenas, estimates of incremental costs are provided fairly routinely, and appear to be determinable to a reasonable degree of approximation without enormous cost or effort. Thus, if the rule is correct, to calculate the efficient price of a bottleneck service one need merely observe the final-product price currently charged by the owner of the bottleneck facility, and subtract from it the pertinent incremental cost.[4]

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because that is not a service of the bottleneck facility itself. Thus, those costs *are* part of the owner's incremental costs that are subtracted from the owner's final product price to yield the price for access; subtraction of those costs clearly reduces the price of access under the formula. Therefore, the formula yields the proper price for access regardless whether the form of access is switching, in which the entrant does not get physical access, or trackage rights, in which it does. However, if trackage rights impose some additional costs on the bottleneck owner, those costs should, of course, be added to the price of access.

[4] The formula applies whenever the bottleneck railroad offers service over the competitive segment, in effect a single-line service from origin to destination. If the bottleneck railroad does not offer service over the competitive segment, then the access price is simply the bottleneck owner's incremental cost of providing access plus the contribution to fixed and common costs that the incumbent would earn by providing the movement over the bottleneck that is instead provided by the user of the access.

EXHIBIT I.
THE LEVEL-PLAYING-FIELD THEOREM:
DERIVATION OF THE COMPETITIVE NEUTRALITY FORMULA
FOR ACCESS PRICING[5]

We have defined a **level playing field** in the pricing of access to require the following: Suppose a firm's incremental cost (**IC**) per unit of output of supplying the non-bottleneck components of the final product is X dollars less than that of a bottleneck-owning competitor (or the reverse). Then this more-efficient firm should just be able (without losing money) to price the final product by X dollars less than the price charged by its less efficient competitor. More formally: we have the following definition of a level playing field:

(1) Bottleneck owner final-product price – minimum viable competitor final-product price = IC of remaining inputs supplied by owner - IC of remaining inputs supplied by competitor.

But we know that the competitor's minimum (financially-viable) price is

(2) minimum viable competitor final-product price = price of bottleneck service + IC of remaining inputs supplied by competitor.

Adding these two equations we immediately obtain the <u>competitive neutrality formula</u>:

(3) the only price of bottleneck service that provides a level playing field =
bottleneck owner final-product price - IC of owner-supplied remaining inputs.

So it follows that

Any bottleneck service price that violates competitive-neutrality formula (3) must "tilt the playing field," favoring either the bottleneck owner at the expense of its competitors or the reverse**.**

[5]This result was originally contributed by Robert Willig, with the current author participating in its dissemination and adaptation to particular regulatory and analytic issues.

B. Market Forces and Access at the Parity Price through Voluntary Negotiation

The obvious next question, a critical matter for regulatory policy, is whether regulatory intervention is necessary to ensure that parity prices set in the marketplace for access at least approximately satisfy the efficient component-pricing rule, or whether that result will be achieved be market forces alone. There is some *a priori* reason from which one can argue that the market mechanism can produce that result without intervention. That is, this view asserts that an incentive exists for the pertinent firms in reality to arrive at something like an ECPR figure when negotiating bilaterally over an access fee. While regulatory concerns can inhibit or distort this incentive, the market logic, apart from the effects of regulation, is clear as I will now show.

First, it is clear that the proprietor of a bottleneck input has every incentive to offer access voluntarily to final-product competitors, provided that the access price is right. Thus, suppose the proprietor expects to earn $500 per unit of final product (such as point-to point transportation service) that it turns out with the help of the bottleneck. Then suppose the competitor proposes to pay for access $600 per unit it sells of the final product, having taken that business away from the bottleneck owner. Clearly at that price the owner firm is far better off losing that business, for it then gains as an access seller an additional $100 per unit of final product business it gives up to the rival. But it does not pay the proprietor of the bottleneck to provide such access at any price that does not at least cover incremental cost including incremental profit loss that results from the transaction. This minimum price, which is demonstrably the ECPR price, then is the lowest price that one can expect to be accepted in such voluntary negotiations. At that price a rational proprietor of a bottleneck will be indifferent between its use by itself and its use by competitors. For at that ECPR price the bottleneck owner receives the same net compensation

whether the final product and its non-bottleneck components are supplied by itself or by a rival. That is, payment of the incremental foregone profit as part of the incremental cost of access compensates the bottleneck owner fully but exactly for any profit lost because of use of the invention by rivals.

Moreover, if the competitor is more efficient than the bottleneck owner at carrying out the remainder of task of final product supply, the competitor will find it profitable to pay for access the ECPR price and a little more. That is, in terms of the previous example, where the bottleneck owner's relative inefficiency means that its production will yield a margin of only $500 per unit of output, the access purchaser's superior efficiency will enable it to elicit a margin of $600. So, if it compensates the owner for the services of the bottleneck by paying an access price of, say, $501 per unit of output, it will still receive a $99 reward for its superior efficiency.

The prospective purchaser of access will be unable to afford to pay the ECPR price only if it is the less efficient in carrying out the remainder of the steps in production of the final product because then its surplus will be less than the $500 ECPR compensation of the bottleneck owner In other words, pricing in accord with ECPR allocates the task of supplying the remaining inputs to the most efficient provider. Consequently, it serves the interests of the bottleneck owner along with those of the general public.

And that owner will not find it profitable in the long run to extract a fee that prevents those who acquire access from earning their efficiency rents and obtaining the competitive return on their capital. For that will deprive the bottleneck owner of an efficient supplier of the remaining final-product inputs. As we have seen, such a loss of efficient supplies must reduce the maximum net profits the owner can hope to obtain. ECPR pricing just permits the access purchaser to earn the competitive rate of return, including its efficiency rents – the extra surplus

generated by its superior efficiency. So the proprietor of the bottleneck can lose if it drives the fee well above this level. Since no lower fee and no much higher fee is more profitable to the owner, one can expect voluntary negotiations to yield a fee close to the ECPR level.[6]

The workings of the market mechanism in this case can be put in terms of the incentives of the two parties, with a showing that both seller and the purchaser of access have some incentive to carry out the transaction at an ECPR fee.

(a) The access supplier's incentive. It will pay the owner of a bottleneck facility to permit its rivals to use it whenever those rivals are prepared to offer a fee that gives the facility owner a return an iota higher than she can obtain by using it herself. But if the competitor's price corresponds to its costs such a price offer will be profitable to the access purchaser when and only when it is a more efficient user of the bottleneck facility than is the owner of the technology. And then the price can cover any profit the owner foregoes as a result of its sale of access. That is, suppose the owner earns, say, $100 in profit for every unit of final product it turns out itself with the aid of the facility and then sells. Then it is clearly better off if access is provided to a rival who pays a parity-price access fee yielding $101 per unit of final product sold by that competitor.

(b) The access purchaser's incentive. A access purchaser more efficient than the facility owner at turning out the final product should, by definition, earn a gross return

[6] The bottleneck owner may, of course, be tempted to extract some of the rents. If these are true economic rents their transfer to the owner will, however, not affect the outputs of the access purchasers.

greater than the $500 per unit of final product in the previous illustration. If, for example, it earns $520 in the process, an ECPR fee of $101 will obviously leave it with a net gain of $19 above the normal profit on its capital.

That, in essence, indicates the incentives automatically provided by the market mechanism for voluntary supply of access to bottleneck facilities, and for agreement by all parties involved to a price that meets the requirements of economic efficiency.

The conclusion from this portion of my analysis, then, is that rational railroad managements have a powerful incentive to make their bottleneck facilities available to others, event to competitors – if the price is right. And at an ECPR price, that incentive will be sufficient for them to provide the access voluntarily, and without regulatory intervention that can easily result in access prices inconsistent with competitive neutrality and economic efficiency.

C. Unlike Industries Such as Electricity and Telecommunications, Imposed Access in Railroads Cannot be Expected to Result in a Material Increase in Competition .

Despite this reasoning, in the U.S. access regulation has recently been *imposed* by law and regulation in industries such as telecommunications and electricity at a time when new technology and other changes in the industries, such as the emergence of new, low-cost suppliers, were creating new competitive options. What is the rationale for such intervention and, if valid, the question is whether the same approach in rail regulation is defensible. In telecommunications and electricity, for example, policymakers were legitimately concerned that the incumbent owners of monopoly facilities could discourage the emergence of these new competitors through monopolization and self-preference. New electricity generators could be prevented from entering by denial of service on the utility-owned transmission facilities. And in telecommunications, the near monopoly local exchange carriers could prevent entry into the

local loop by imposing obstacles to rental of the use of their facilities. An important objective of imposed access, therefore, was to promote competition by making it possible for new firms to enter the market.

But the situation in rail transportation is quite different. What type of new entry can be hoped for as a consequence of imposition of access in the railroad industry? There is the possibility of service competition and some minor price competition, but the competitive gains that can reasonably be expected appear to be modest, at best. Unlike the entry of new electricity generators who bring new facilities with them or the development of new gas fields that were previously untapped, imposed access in the rail industry is not even intended to lead to construction of new railroad lines or new facilities in bottleneck areas. Railroad demand is simply not large enough to encourage new entry into the railroad industry given the enormous sunk cost required for replication of the current facilities. Also, there is no major new railroad technology or new low-cost operating techniques whose utilization would be promoted by forced access. The only conceivable benefit would be the invasion by one railroad of another's territory, but this would hardly constitute new competitive entry of the type promoted in the other industries under discussion.

More important, even under a forced access regime, there is no reason to believe that any change in railroad operations would occur unless the regulator set access prices at a level that subsidized the entry of a less efficient railroad. New entry under those conditions would not represent an increase in competition. On the contrary, it would lead to inefficiency results that would never persist in any effectively competitive market.

D. Coordination Issues for Usage of Bottleneck Facilities by Recipients of Access

There is another major and very pertinent difference between the tasks carried out in the railroad industry and the electric, gas and telephone industries. In railroading, the use of the affected facilities by those to whom access would be granted raises profound scheduling, coordination and administration problems that have no counterpart in the other industries. Railroads must, for example, handle each piece or block of traffic separately; there is no fungibility and no automatic routing.

In electricity, in contrast, the electrons are clearly fungible. No customers care which generator contributes the power they receive, so long as the quantity and timing are as they desire. In addition, when one generator's electricity is introduced into the grid it does not interfere with another's, assuming capacity to be adequate. The same can be said of molecules of natural gas; the molecules delivered are not the molecules that were injected into the system at some distant upstream point. In telecommunications, while the traffic – the voice or data messages – are not fungible, even sophisticated routing, such as packet switching, is automatic.

Transportation of railroad freight from one point to another on the railroad network is far more complicated and requires more physical coordination and planning. Technological solutions can only reduce the problem to a degree. Freight cars need to be gathered physically from shipper facilities to yards where cars can be classified according to traffic type and destination. Car blocks are formed and then put together into trains for longer haul movements. If interchanges occur, the trains must be pulled apart so the car blocks can be handed off to the interchange partners. All of this requires substantial manpower and equipment in yards where

car classification and switching occur, as well as extensive planning and coordination by management to ensure that the traffic moves efficiently.

Even the most simple type of required access -- under which a railroad would be required to interchange with another railroad at a point designated by the shipper or the competing railroad -- would interfere with efficient handling of traffic and impose unnecessary operating costs. If shippers or competitors are permitted to dictate where interchanges will occur a railroad may be forced to spread resources over a larger number of interchange facilities, increasing cost beyond optimal levels. Or it may be forced to switch traffic at points at which resources are not adequate, creating delays that can spread throughout the network.

Forced access can also undermine efficiency in decisions on investment and scheduling needed to accommodate different types of traffic. Not only must a railroad ensure that a particular car moves from its origin to its designated destination, but it must coordinate the movement of several types of traffic with different characteristics. The same segment of a rail line may be used to handle traffic with different time sensitivity, different operating characteristics, and different prices. Fast, intermodal trains must be handled differently from high-volume unit coal trains. It is necessary for railroad management to coordinate marketing, operating and investment decisions if it is to achieve anything like an optimal mix of these traffic types along with the most efficient allocation of the required resources. Forced access would make it more difficult to reach and carry out efficient decisions on coordination of these different traffic types.

That this problem of coordinating multiple operators over a fixed network is no figment of the imagination is easily demonstrated. For example, in 1995 the World Bank conducted a review of railway restructuring programs in Japan, New Zealand, Sweden and the U.K. In its

report, it commented "The costs of operating coordination and the inevitable operating conflicts which arise as the number of distinct services increases over a single line cancel out the economic gains realized through managed competition."[7]

Three major conclusions follow from this discussion.

- First, if regulators set an access charge below the level called for by the requirements of competitive neutrality, it would not increase competition, but simply would amount to a cross-subsidy that allows less efficient providers to take business away from a more efficient competitor.
- Second, if regulators set access charges at a level that does not distort competition between the bottleneck owner and its competitors, a forced access regime cannot be counted upon to result in any material changes in the way traffic is handled today. As explained previously, the current regime already gives the owner of a bottleneck facility the incentive to lease the facility to a competitor railroad if the other railroad can handle the traffic more efficiently.
- Third, imposed access can have serious consequences both for competition and for efficiency and viability of the railroads. If regulation happens to end up with access fees that are out of line with the requirements of competitive neutrality they will provide competitive advantages to railroads that are not the most efficient suppliers of the affected services. By complicating the coordination problems and in other ways the access requirement can add materially to costs and, ultimately, to the prices that must be borne by shippers and the general public.

[7]R. Kopicki and L. Thompson, *Best Method of Railway Restructuring and Privatization*. Washington, D.C.: The World Bank, August 1995, p. 319.

VI. On the Competitive Market Model Rule for Regulatory Price Ceilings

The last subject that I will address here is what measures are appropriate to adopt to prevent excessive prices for any railroad services. Though railroads face substantial competition from road, water and air transportation in much of their activity, there is sometimes reason to adopt regulatory pricing rules to ensure that there will be no prices that are unacceptably high in arenas in which it is suspected that the railroads possess some degree of market power. But the choice of a formula or process for the determination of an appropriate ceiling on such prices is a matter that requires the utmost care. For history has repeatedly demonstrated the great inefficiencies and distortions of the economy that can result from thoughtlessly selected price ceilings. They can create shortages where none need occur, they can lead to enormous waste, particularly of underpriced products, and they can virtually destroy industries as only a few decades ago they almost destroyed the rail network of the United States.

Here again, the competitive market model provides the appropriate guidance. We know that in a market with full freedom of entry and exit prices can never remain at levels that yield profits above the competitive level. We also know how the market mechanism handles this issue. In effect, it adopts both a floor and a ceiling for final-product prices, leaving management free to select prices in between these two in accord with current demand patterns and other market pressures.

The reason for a price ceiling seems self evident, but the grounds for adoption of a floor will be less obvious to the layman. The firm must not be permitted to charge price that are excessive, and yield monopoly profits by exploiting consumers. But it also must not be permitted to charge prices so low that they can destroy any new competitor, prices that no competitive firm would accept for any substantial period.

The magnitude of the appropriate price floor can be deduced from the fact that no firm in a contestable market will be willing in the long run to supply any product at a price below the incremental cost of that product. It will not do so because only a price equal to or above the incremental cost of the product will enable the firm to recover that incremental cost -- the cost that is caused by its decision to supply that product. Consequently, incremental cost becomes the regulatory price floor that the analysis gives us. While pricing down to directly variable cost may be acceptable for a very short period, the proper floor for the pricing of any particular product over time must be incremental cost, which includes the fixed costs directly attributable to that product alone.

Similarly, stand-alone cost is the appropriate ceiling over prices, according to the competitive market model, since no price above stand-alone cost can persist for any significant period in a perfectly contestable market. That is so because, by definition, any price above stand-alone cost will attract entrant competitors who will be able to take the business away from the firm with these high prices. To summarize, the contestable markets rule can appropriately guide regulatory agencies in constraining pricing by firms considered to have market power is the following:

(1) No price is allowed to be higher than stand-alone cost; (2) no price is allowed to be lower than incremental cost; (3) any price in between these two levels is permitted, at the discretion of management, in order to permit it to respond quickly and appropriately to evolving market conditions.

These rules guarantee consumers that they will pay no more for what they buy than they would in a market that is very competitive as a result of perfect freedom of entry. Moreover, potential competitors are guaranteed that their entry will not be blocked by cross-subsidized prices below the minimum level that competitive firms will accept in the long run.

This conclusion solves the price regulation problem in principle. But how does it work out in practice? One legitimate concern, for example, is whether anyone in reality knows how to calculate stand-alone cost. The answer is that since the ideas just described first appeared and began to be used by courts and regulatory agencies, these calculations have been made with increasing frequency by regulated firms or their competitors or their customers and have been submitted by them to courts and regulatory agencies. Indeed, there are now research firms that specialize in collection of the required financial and output data and their use in providing incremental and stand-alone cost statistics.

But economic theory goes beyond just suggesting such rules. It can sometimes help in making the required calculations. The price-floor price-ceiling issue is a clear example. There the analysis has provided a number of short cuts that can greatly facilitate the calculations. Only one of these will be described here. There is a theorem derived from economic analysis showing that it is unnecessary to calculate *both* the incremental and the stand-alone costs of the regulated firm. *Either of these calculations alone* will do the job. For if the firm is earning no more than competitive profits overall and none of its prices are below incremental costs then, as will be demonstrated in Exhibit 2, below, none of those prices can possibly be above stand alone costs (and conversely). So, to enforce the price-ceiling and price-floor rules, the regulator only needs data on the firm's rate of return and *either* its incremental or its stand-alone costs, but *not both*.

EXHIBIT 2
ONE PRICING TEST, NOT TWO:
INCREMENTAL COST FLOOR *OR* STAND-ALONE COST CEILING

Consider a firm with two products, service X and service Y. Then,

Since the total cost of X and Y *must equal* the cost of producing Y all by itself (Y's stand-alone cost) plus the further cost of adding the production of X (the incremental cost of X)

It follows (by definition) that

(1) Incremental cost of X = Total cost - Stand-alone cost of Y.

Suppose the firm earns competitive profits overall, so that

(2) X Revenue + Y Revenue = Total cost (including competitive return)

Then (1) becomes

(3) Incremental cost of X = X Revenue + Y Revenue - Stand-alone cost of Y,
that is,

(4) X Revenue - Incremental cost of X = Stand-alone cost of Y - Y Revenue.
It follows at once that

(5) X Revenue > Incremental cost of X (the IC test criterion)
if and only if

(6) Stand-alone cost of Y > Y Revenue (the SAC test criterion).

Basic result: IF ALL OF THE FIRM'S PRICES PASS *EITHER* TEST, THE PRICES MUST PASS *BOTH* TESTS.

VII. Concluding Observations

I have endeavored to show here that practical experience along with economic analysis provide guidance for railroad rate regulation that can assist in promotion of economic efficiently and that serves the public interest. I have shown that effectively competitive markets, with the benefits they are known to ensure to the economy, can serve to provide guidance for desirable regulatory policy. In particular, I have described the implication for three issues. First, I have sought to demonstrate the necessity of permitting differential pricing as a requirement for financial solvency of the railroads. Second, I have described the nature of the price that should, in accord with the competitive market model, be charged for access to the services of any bottleneck facilities owned by a railroad in order to ensure competitive neutrality and efficiency. Finally, I have shown how and to what degree effectively competitive markets constrain final product prices, and indicated why the prices of rail transportation services should be constrained no more and no less. All of these rules are workable and understandable. And they promise benefits to the public that alternative approaches will deny.